Fuel Modification Protects Master-Planned Community

Full Mitigation Best Practice Story

Orange County, California

Orange, CA – Devastating wildfires raged across Southern California in October 2007. One of these fires, known as the Santiago Fire, started in the Santiago Canyon the evening of October 21 and burned 28,400 acres. It came extremely close to the master-planned community of Serrano Heights, in the city of Orange. Fortunately, no homes were damaged in the community due to carefully designed fuel modification zones and fire-resistant construction of the houses.

The Santiago Fire destroyed 15 residential structures and nine outbuildings and damaged eight residential structures and 12 outbuildings, according to the California Department of Forestry and Fire Protection (CAL FIRE). Strong Santa Ana winds, in conjunction with dry vegetation, spread the fire over thousands of acres, making it extremely difficult for firefighters to contain it. It was the second wildfire to threaten Serrano Heights in the same year. The first, the Windy Ridge Fire, in March 2007, also came close but didn't damage any homes.

A master-planned community differs from a typical subdivision by the large number of amenities and vast land area that it incorporates. Before creating a plan, the developer works closely with the community to understand its needs and to create a place that will contribute to the area. Shopping, commercial centers, schools, places of worship, and other amenities are often included in the plans. Because of the size of the community, there are usually several builders involved offering a variety of house plans, which makes it less of a cookie-cutter neighborhood.

As a master-planned community, Serrano Heights involved much advance planning and ongoing coordination between private and government entities. Serrano Heights is located on a hillside and is divided into west side (Phase I) and east side (Phase II). The west side fuel modification area falls under the jurisdiction of the city of Orange and the east side falls within the jurisdictions of the cities of Orange and Anaheim.

"It is very important for city management, building department and the fire department to be on the same page early on" said Ian MacDonald, Deputy Fire Marshal for the City of Orange Fire Department. "Jurisdictions need to understand their community and have fuel modification plans ready, so they can work closely with developers to avoid future problems."

In order to avoid a potentially difficult problem with power line easements and to comply with fuel modification requirements, the landowner worked closely with the city of Orange fire department, the county of Orange, and the city of Anaheim fire department during the planning process. The result was a creative solution to the power-line problem by creating a park and approximately 200 acres of preserved open space which benefits the residents.

Serrano Heights was built according to the City of Orange Fire Department stringent rules for fuel modification zones, fire officials said. The zones are wide strips of land where combustible vegetation has been removed and/or modified and replaced with drought-tolerant, fire-resistant plants to provide an acceptable level of risk from wildland and vegetation fires.

A typical fuel modification installation consisted of a 20-foot setback zone (Zone A), a 50-foot minimum irrigated zone (Zone B), with an additional 100-foot minimum of vegetation thinning zones (Zones C and D). The minimum width of the fuel modification zone for Serrano Heights is 170 feet and in several areas the width increases due to the type of terrain and/or type and mass of vegetation, according to the Orange fire department.

The state's new 100-foot Defensible Space Law, which went into effect after Serrano Heights was built, calls for a 30-foot cleared setback area with limits on plants immediately around each home in the wildland urban interface and the next 70-feet to be a fuel reduction zone with irrigated fire-resistant vegetation.

"With beauty comes the dangers," said Patrick Murphy, one of the landscape architects who worked on the Serrano Heights project. "Fuel modification can be a real issue and how you address that is the key."

A company was hired to prepare a fire behavior analysis and preliminary fuel modification plan for Serrano Heights. The plan included detailed studies regarding fire environment, Southern California climate, wildland fire behavior, local fire history,

general and individual lot recommendations for fuel modification zones, and additional fire protection measures.

The plan was reviewed and approved by the city of Orange and city of Anaheim fire departments. During implementation and construction, the fire departments of both cities carefully monitored each phase to ensure the requirements were met.

The requirements and guidelines for areas inside homeowners' property lines are specified in the Covenant, Conditions, and Restrictions (CC&Rs) and in the deed for each property. They are enforced by a management company and the Serrano Heights Homeowners Association (HOA). The areas outside of the homeowners' property lines are maintained by the HOA. Twice a year the management company sends a letter to the city of Orange on behalf of the HOA stating that it is complying with the rules and, as needed, inspections are done.

"When it comes to master-planned communities, it is much easier for the Fire Department to deal with a homeowners association so there's only one point of contact," said MacDonald. "Serrano Heights HOA and the City of Orange Fire Department work very well together."

The defensible space created by the fuel modification areas was tested twice in 2007 and proved to be very effective against both fires. Javier Reyes, president of the company providing landscaping for Serrano Heights since 2000, said, "Having the area clear and moisture on the ground definitely helped keep embers from causing fires. It proved that the irrigation system worked."

"Serrano Heights does a very good job of maintaining their fuel modification area. A fuel modification plan is useless if there's no proper maintenance," said MacDonald. "It's much cheaper to do the maintenance than to have to go back and do the work all over again to bring it up to standard."

All residences in the community were built to meet standards from the Uniform Building Code (UBC) and the Uniform Fire Code. These codes take into consideration multi-hazards including seismic activities. The houses were built with non-combustible materials on the exterior walls, cornices, eave overhangs, soffits, exterior balconies and fencing; class "A" roofing, attic and foundation ventilation covered with metal louvers, and a .25-inch mesh corrosion-resistant screen.

Serrano Heights, with its 998 homes, plays an important role in the community. If a fire were to reach the homes, it could have a huge socio-economic impact in the area. The residents, however, are confident that they are doing the best they can to prevent that.

"I don't feel threatened," said Don Gray, Serrano Heights HOA president, "I know there's a risk of fires, but I'm not that concerned. The pre-planning was very well done for this community."

Activity/Project Location

Geographical Area:	**Single County in a State**
FEMA Region:	**Region IX**
State:	**California**
County:	**Orange County**
City/Community:	**Orange**

Key Activity/Project Information

Sector:	**Private**
Hazard Type:	**Fire; Wildfire**
Activity/Project Type:	**Building Codes; Vegetation Management**
Activity/Project Start Date:	**01/2000**
Activity/Project End Date:	**Ongoing**
Funding Source:	**Private funds**

Activity/Project Economic Analysis

Cost:	**Amount Not Available**

Activity/Project Disaster Information

Mitigation Resulted From Federal Disaster?	**No**
Value Tested By Disaster?	**Yes**
Tested By Federal Disaster #:	**1731 , 10/24/2007**
Repetitive Loss Property?	**No**

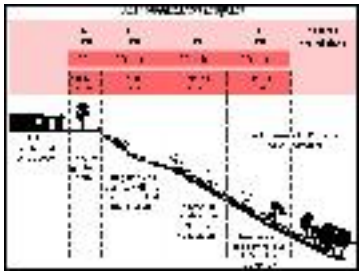
Reference URLs

Reference URL 1:	**http://www.fire.ca.gov/**
Reference URL 2:	**http://www.fema.gov/hazard/wildfire/index.shtm**

Main Points

- The Santiago Fire came extremely close to the master-planned community of Serrano Heights, in the city of Orange. Fortunately, no homes were damaged in the community due to carefully designed fuel modification zones and fire-resistant construction of the houses.
- As a master-planned community, Serrano Heights involved much advance planning and ongoing coordination between private and government entities.
- In order to avoid a potentially difficult problem with power line easements and to comply with fuel modification requirements, a park and approximately 200 acres of preserved open space was created which benefits the residents.
- Serrano Heights was built according to the City of Orange Fire Department stringent rules for fuel modification zones. The zones are wide strips of land where combustible vegetation has been removed and/or modified and replaced with drought -tolerant, fire-resistant plants to provide an acceptable level of risk from wildland and vegetation fires.
- The state's new 100-foot Defensible Space Law calls for a 30-foot cleared setback area with limits on plants immediately around each home in the wildland urban interface and the next 70-feet to be a fuel reduction zone with irrigated fire-resistant vegetation.
- The requirements and guidelines for areas inside homeowners' property lines are specified in the CC&Rs)and in the deed for each property. They are enforced by a management company and the Serrano Heights Homeowners Association.
- The defensible space created by the fuel modification areas was tested twice in 2007 and proved to be very effective against both fires.

Firefighters use irrigated defensible space in Serrano Heights to fight Windy Ridge Fire



Fuel modification zones

Aerial view of the Serrano Heights Community

The homes shown in the photo have stucco exteriors and clay tile roofs.